PATENT SPECIFICATION (11) 1 563 692

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(21) Application No. 15425/78 (22) Filed 19 Apr. 1978 (19)

(31) Convention Application No. 2717189 (32) Filed 19 Apr. 1977 in

(33) Fed. Rep of Germany (DE)

(44) Complete Specification Published 26 Mar. 1980

(51) INT. CL.[3] B65H 75/28

(52) Index at Acceptance
B8M 2E 2H 2V RA

(54) PIRN TUBE FOR TEXTILE THREADS

(71) We, EMIL ADOLFF G.m.b.H. & Co. K.G., a German Kommanditgesellschaft, of Emil-Adolff-Strasse, Postfach 70, D-7410 Reutlingen, Federal Republic of Germany, do hereby declare the invention,

for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to a pirn tube, for example, a re-usable tube, onto which textile thread can be wound, particularly monofilament synthetic thread, and having at one end at least one thread trapping element.

In a known tube (German Utility Model No. 7 625 081 (Fig. 4)), the thread trapping element is a peripheral slot having a back taper, the depth and width diminishing in the direction of its ends. This known re-usable tube does permit peripheral speeds of up to 4000 m/min., but, apart from the difficulty of making the slot, it has been found that its thread trapping reliability is inadequate and that during unwinding of the thread end, a residue of thread may remain in the back taper which, together with further thread residues, gradually blocks the slot so that its trapping capacity is diminished.

The invention is based on the problem of providing a pirn tube which largely avoids the disadvantage of the known tube, reliably gripping the beginning of the thread and allowing the end of the thread to be pulled off without leaving a residue, and without creating imbalance in the tube and increasing noise level during operation.

According to this invention there is provided a pirn tube having at one end at least one thread trapping element defined by two parallel substantially V-section slots each with an acute angled base, the two slots being formed by a ring accommodated in an annular depression extending around the entire periphery of the sleeve of the pirn tube. The two slots offer twice the trapping reliability over the entire periphery of the tube, yet during unreeling release the thread end without retaining any torn-off residue, so that there is little possibility of the slots becoming blocked. At the same time, the pirn tube can be produced relatively easily and inexpensively. Existing tubes can be readily provided with the depression and with the ring fitted into it. The invention is applicable particularly to re-usable tubes but may also be used for disposable tubes, if the tube material can withstand the radial pressure of the ring.

A pirn tube of the invention can be made in two parts with the diametral plane of division intersecting the bottom of the depression, whereby a ring of for example steel and not of an elastic material, may be used. Manufacture and operation of the resultant thread trapping element would however be less simple or satisfactory than in the preferred embodiment of pirn tube in which the ring is of plastics material which is elastically enlargeable. Thus the depression can be subsequently applied to a one-piece tube. The choice of plastics material, and in particular its degree of elastic enlargement, which may in diameter be approximately 50% and in circumference approximately 100%, depend upon the dimensions of the tube, the depression and the ring.

A commercially available sealing ring has been found to permit peripheral speeds of up to approximately 70 m/sec. without becoming radially enlarged and losing the trapped thread commencement. Such a ring may be of polyurethane.

In the preferred embodiment, there are two diametrically opposed bores in the tube wall, which open into the base of the depression, so that a ring fitted on the pirn tube in the depression can be radially enlarged and then removed. For this pur-

pose, push members are inserted through the bores. The diametrically opposed arrangement of the bores compensates for imbalance.

The ring of the preferred embodiment is located entirely within the annular depression. The fact that the ring is flush-fitting ensures that the lost turn which precedes the thread reserve and consists of the insufficiently stretched, and therefore not further usable, thread commencement can be accommodated, without raising the level of the tube periphery outside the ring, alongside the ring in the depression, so that it can no longer cause interference during winding on or off.

Use of an O-ring to form the trapping element produces the V-shape of the slots automatically. The thickness of the O-ring should be smaller than the radial extent of the depression, so that it is also possible to accomodate the waste turn of the thread.

The invention will now be described by way of example with reference to the drawings, in which:-

Figure 1 is a broken away central longitudinal section through an embodiment of pirn tube in accordance with the invention;

Figure 2 is an enlarged detail of Figure 1 in the region of the tube end; and

Figure 3 is similar to Figure 2 but showing a ring fitted.

Referring to the drawing, a pirn tube of plastics material, which can be shaped by machining, is a hollow circularly cylindrical tube at one end of which there is an annular depression 10 formed by a cutting tool and extending around the entire periphery of the tube. The depression is at a distance from the end of the tube such that on the one hand a friction wheel can be caused to drive the tube at a high peripheral speed and on the other little space is lost for accomodation of reserve thread. Opening into the base 12 of the depression are two radial, coaxial bores 14 and 16 in the wall of the tube. In the depression is a radially enlargeable ring 18 which, in its undistorted condition, is of circular cross-section.

The cross-sectional shape of the annular depression is symmetrical in relation to its radial central plane and each half is made up as follows:-

a first half 22 of an arc which half is 60° in extent and of radius 0.8 mm. This half 22 has tangentially adjacent to it a straight portion 24 of approximately the same length, providing a plane flank 26 to the depression 10, which flank is at an acute angle to the central plane 20. The straight portion 24 ends tangentially in an opositely curved second arc 28 which is approximately twice the length of the portion 22 and has a radius of 1.3 mm. The two portions 28 each form a convexly curved flank 30 (Figure 3) in the depression 10 which merges tangentially into the cylindrical surface 32 of the tube. The diameter of each bore 14, 16 is 1.5 mm, and is such that, at the location of the bores, the base 12 of the annular depression 10 is completely removed.

The fitted ring 18 has an undistorted radius of 0.9 mm and thus exceeds the radius of the base 12 of the depression 10 by 0.1 mm. The ring 18 is therefore shaped by the flanks 26 of the depression 10 into a cross-section (Figure 3) which provides a recessing depth T of 0.5 mm when the ring fills the base 12 of the depression 10.

The thread trapping element thus formed has two slots 34, 36 which are substantially V-shaped in cross-section (Figure 3) and which are formed by the two convex flanks 30 and the exposed periphery of the ring 18 which is less than half a circle. The acutely angled bottom 38 of the two slots 34, 36 is in each case substantially at the transition between the straight flank 26 and the convex flank 30 of the depression 10. The maximum width of the depression 10, measured at the cylindrical surface 32, is 45 mm.

WHAT WE CLAIM IS:-

1. A pirn tube having at one end at least one thread trapping element defined by two parallel substantially V-section slots each with an acute angled base, the two slots being formed by a ring accommodated in an annular depression extending around the entire periphery of the sleeve of the pirn tube.

2. A tube according to Claim 1, wherein the ring is of plastics material.

3. A tube according to Claim 2, wherein the ring is a sealing ring.

4. A tube according to any of Claims 1 to 3, having two diametrically opposed bores which pass through the tube wall and open into the base of the depression.

5. A tube according to any preceding Claim, wherein the ring is located entirely within the annular depression.

6. A tube according to any preceding Claim, wherein the ring is an O-ring.

7. A tube according to Claim 6, wherein the thickness of the O-ring is less than the radial extent of the depression.

8. A tube according to any preceding Claim, wherein the cross-sectional shape of the depression is symmetrical in relation to the radial central plane of the depression

9. A tube according to Claim 8, wherein half the said shape is composed of a first portion of an arc of less than 90° length, tangentially adjacent thereto a straight portion of approximately the same length and, curved in the opposite direction, a second arcuate portion of approximately twice the length.

10. A tube according to Claim 9, wherein, for a ring thickness of 1.8 mm, the first

portion has a radius of 0.8 mm and the second portion a radius of 1.3 mm.

11. A pirn tube constructed and arranged substantially as herein described and shown in the accompanying drawing.

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Printed for Her Majesty's Stationery Office,
by Croydon Printing Company Limited, Croydon, Surrey, 1980.
Published by The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1.

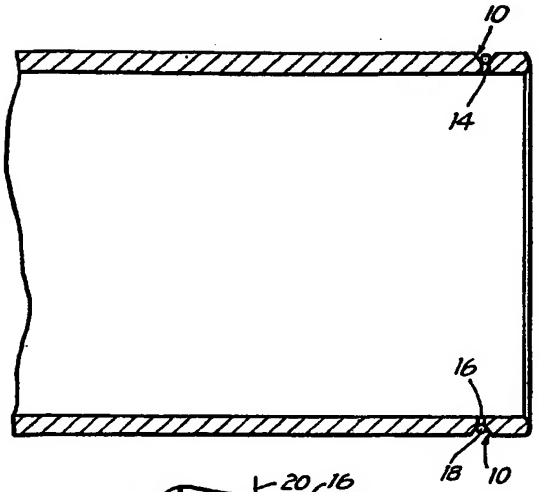

Fig.2.

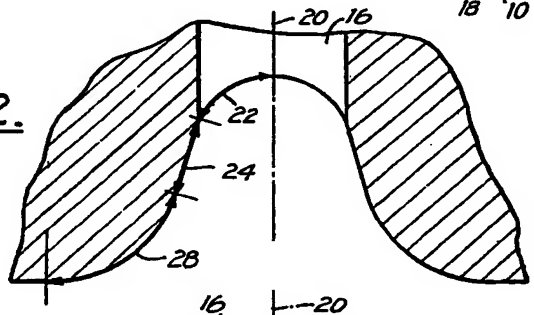

Fig.3.